

**REMARKS**

**Election/Restriction**

**The restriction was maintained by the Examiner.**

The Examiner alleged as follows:

The traversal is on the ground(s) that the application is a US national stage application. This is not found persuasive because The inventions listed as Groups I & II do not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, they lack the same or corresponding special technical features for the following reasons: Claims 1-3 are directed to a technical feature comprising a R-Fe-B alloy system, while claim 4 relates to a physical film formation utilizing a method of heat treating.

However, the allegation does not accord to the USPTO practice of unity of invention.

Claims 1-3 are directed to an R-Fe-B alloy based thin film magnet and claim 4 is directed to “method for preparation of the R-Fe-B alloy based thin film magnet according to any one of Claims 1 to 3.” Regarding unity of invention on combinations of different categories of claims, 37 CFR 1.475 provides as follows:

(b) An international or a national stage application containing claims to different categories of invention will be considered to have unity of invention if the claims are drawn only to one of the following combinations of categories:

- (1) **A product and a process specially adapted for the manufacture of said product; or**
- (2) A product and a process of use of said product; or
- (3) A product, a process specially adapted for the manufacture of the said product, and a use of the said product; or
- (4) A process and an apparatus or means specifically designed for carrying out the said process; or
- (5) A product, a process specially adapted for the manufacture of the said product, and an apparatus or means specifically designed for carrying out the said process.

Also, MPEP explains as follows:

A process is specially adapted for the manufacture of a product if it inherently results in the product and an apparatus or means is specifically designed for carrying out a process if the contribution over the prior art of the apparatus or means corresponds to the contribution the process makes over the prior art.

Thus, a process shall be considered to be specially adapted for the manufacture of a product if the claimed process inherently results in the claimed product with the technical relationship being present between the claimed product and claimed process. The words "specially adapted" are not intended to imply that the product could not also be manufactured by a different process.

(MPEP 1850 IIIA).

Thus, the restriction was improper and should be withdrawn.

**Rejections under 35 USC §102(b)**

**Claims 1-3 are rejected under 35 USC §102(b) as being anticipated by Yamashita et al. (U.S. Patent No. 7,285,338).**

The Examiner alleged as follows:

As to Claim 1, Yamashita et al. '338 discloses that the magnetic flux density is determined by the percentage of rare earth material in the film such as R<sub>2</sub>Fe<sub>14</sub>B and further discloses the density can be impacted by manipulating percentages (Col. 5, 6, Line 59-67, 1-4). **Examiner interprets the grain diameters to be an inherent feature as both applicant and '338 look to utilize a heat treated R-T-B magnetic thin film, and both use R<sub>2</sub>Fe<sub>14</sub>B.** It has been held that where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes, the burden of proof is shifted to applicant to show that prior art products do not necessarily or inherently possess characteristics of claimed products where the rejection is based on inherency under 35 USC §102 or on prima facie

obviousness under 35 USC 9103, jointly or alternatively. *In re Best, Bolton, and Shaw*, 195 USPQ 430. (CCPA 1977).

U.S. Patent No. 7,285,338 issued on October 23, 2007 while the priority date of the present invention is March 23, 2004, which is earlier than the issue date of U.S. Patent No. 7,285,338. However, the PCT application of U.S. Patent No. 7,285,338 was published as WO 02/15206 on February 21, 2002. Therefore, the claims should be rejected under 35 USC §102(b) over WO 02/15206 rather than over U.S. Patent No. 7,285,338.

Even if the present claims are rejected over WO 02/15206, the present invention patentably distinguishes over Yamashita et al. Yamashita et al describes as follows:

As a result of extensive research into the high magnet characteristics of thin-film rare-earth permanent magnets, the inventors discovered that **the residual magnetic flux density can be markedly increased by layering one or a plurality of atomic layered units in which a monoatomic layer based on a rare-earth element is layered on a substrate of a nonmagnetic material, and a plurality of monoatomic layers of a transition metal element are then layered**, whereby each unit has an axis of easy magnetization in the layering direction, and the percentage content of the transition metal element in relation to the rare-earth element is increased.

In addition, the inventors perfected the present invention upon discovering that the formation of reverse magnetic domains can be controlled and oxidation prevented, that a heat treatment can be conducted, particularly at a temperature of 900 K or less, that magnetic characteristics, and coercive force in particular, can be markedly improved by the heat treatment, and that a thin-film rare-earth permanent magnet having excellent magnetic characteristics can be produced by forming one or more monoatomic layers of a rare-earth element on the uppermost monoatomic layer of a transition metal element after the layering of the atomic layered units has been completed.

(Yamashita et al., column 2, lines 8-32).

Thus, according to Yamashita et al., the thin-film rare-earth permanent magnet is made of one or a plurality of atomic layered units in which a monoatomic layer based on a rare-earth element is layered on a substrate of a nonmagnetic material, and a plurality of monoatomic layers of a transition metal element are then layered. The heat treatment is inseparably connected to the atomic layered unit structure, and the atomic layered unit structure is kept after the heat treatment. This will be clear from the fact that anisotropic property is maintained after the heat treatment.

The thin-film magnet disclosed in Yamashita et al. makes a kind of artificial lattice formed by laminating a plurality of monoatomic layers of transition metal between a pair of monoatomic layers formed of rare earth. It is clear from the following descriptions of Yamashita et al. that the thin-film magnet of Yamashita et al. is not alloy magnet:

In the present invention, the film obtained by layering **a large number of monoatomic layers** tends to develop point defects and lattice strain in the joints, and when these are left over, they cause a reduction in coercive force, and the magnetic characteristics are markedly reduced.

In view of this, the coercive force is enhanced and the magnetic characteristics are markedly improved by heat-treating the atomic layered unit in a vacuum or an inert gas atmosphere **to remove the defects or strain**. The temperature of the heat treatment varies with the composition or film thickness and should **preferably be 600 K to 900 K**. **Successfully performing the heat treatment for a long time at a low temperature can control the interdiffusion between the rare-earth element and transition metal element, and ultimately tends to produce a material with high magnetic characteristics**. Interdiffusion is apt to occur between the rare-earth element and transition metal element if the heat treatment temperature exceeds 900 K, and the strain or defects are inadequately corrected, and improved magnetic characteristics are impossible to obtain, if the heat treatment temperature is less than 600 K.

(Yamashita et al., column 6, lines 5-27).

Although the Examiner apparently alleges that claimed and prior art products are produced by identical or substantially identical processes, the heat treatments are clearly different. The temperature of the treatment according to Yamashita et al. is 600 K to 900 K, which is 327 °C to 627 °C, which is significantly lower than the temperature of the present invention of 700 °C to 1200 °C.

Claim 1, as amended, recites “An R-Fe-B alloy based thin film magnet comprising an R-Fe-B based alloy which contains 28 to 45 percent by mass of R element” and “the R-Fe-B based alloy has a composite texture comprising  $R_2Fe_{14}B$  crystals grown by heat treatment of said alloy film and having a crystal grain diameter of 0.5 to 30  $\mu m$  and R-element-rich grain boundary phases formed by the heat treatment present at boundaries between the crystals, and having a nucleation type coercive force.” Thus, the atoms form  $R_2Fe_{14}B$  crystals.

If Nd is chosen as the R element, Nd content in  $Nd_2Fe_{14}B$  is 26.7 wt%. Because the R-Fe-B alloy of the present invention contains 28 to 45 percent by mass of R element, it is clear that the alloy has R element rich phases.

Thus, Yamashita et al. does not teach or suggest, among other things, “An R-Fe-B alloy based thin film magnet comprising an R-Fe-B based alloy which contains 28 to 45 percent by mass of R element” and “the R-Fe-B based alloy has a composite texture comprising  $R_2Fe_{14}B$  crystals grown by heat treatment of said alloy film and having a crystal grain diameter of 0.5 to 30  $\mu m$  and R-element-rich grain boundary phases formed by the heat treatment present at boundaries between the crystals, and having a nucleation type coercive force.”

Moreover, if Yamashita et al's thin-film rare-earth permanent magnet is heated at a temperature of 900K or more, the laminated structure will not be maintained because of inter-diffusion of rare-earth element and transition metal. Therefore, Yamashita et al's thin-film rare-earth permanent magnet is not heated to 900K or more. Although it is not described in Yamashita et al., considering based on common knowledge of persons of ordinary skill in the art,  $R_2Fe_{17}$ , which is thermodynamically stable, will precipitate, but  $Nd_2Fe_{14}B$  will not be made.  $R_2Fe_{17}$  is not suitable to make a magnet.

On the other hand, according to the present invention,  $R_2Fe_{14}B$  is thermodynamically stable in a broad temperature range from room temperature to, for example 1428K (1155°C) when R element is Nd. Therefore, the alloy of the present invention can be heated to 700°C or more.

Yamashita et al. discusses Nd-Fe-B alloy as conventional magnet or the comparative examples. Yamashita et al. describes about the comparative examples as follows:

The starting material shown in Table 1 was used to produce a molten Nd Fe B ingot whose composition is shown in Table 3. The ingot was used as a target, and thin Nd Fe B films whose thicknesses are shown in Table 4 were formed on a Si wafer substrate with the aid of the sputtering apparatus of Example 1. The magnetic characteristics of the resulting thin films were measured by the same apparatus as in the example. The results are shown in Table 4.

(Yamashita et al., column 7, lines 3-10). Nothing indicates that the comparative examples are heat-treated in the same way as the present invention. Also, Table 4 shows Br of C4 and C5 are 0.76 T and 0.75 T, respectively, which are significantly lower than that obtained by the present invention (see Table 2 of the present application at page 25).



Application No.: 10/593,624  
Art Unit: 1794

Amendment under 37 C.F.R. §1.111  
Attorney Docket No.: 062926

For at least these reasons, claim 1 patentably distinguishes over Yamashita et al.

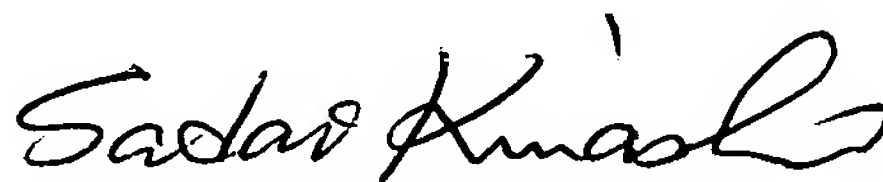
In view of the aforementioned amendments and accompanying remarks, Applicants submit that the claims, as herein amended, are in condition for allowance. Applicants request such action at an early date.

If the Examiner believes that this application is not now in condition for allowance, the Examiner is requested to contact Applicants' undersigned attorney to arrange for an interview to expedite the disposition of this case.

If this paper is not timely filed, Applicants respectfully petition for an appropriate extension of time. The fees for such an extension or any other fees that may be due with respect to this paper may be charged to Deposit Account No. 50-2866.

Respectfully submitted,

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